DIVISION OF WASTE MANAGEMENT
HAZARDOUS WASTE PROGRAM
GREAT PLAINS SYNFUELS PLANT FACT SHEET
DATE: July 2001
PREPARED BY: Stephen Herda

1. **FACILITY NAME** - Great Plains Synfuels Plant - Dakota Gasification Company

2. **RCRA ID#** - NDD000690594

3. **MAILING ADDRESS AND PHYSICAL LOCATION** -
PO Box 1149 7 miles northwest of Beulah, ND
Beulah ND 58523

4. **FACILITY CONTACT** - Richard Nelson, Senior Environmental Engineer

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5. **EPA HWP CONTACT (RPM)** - Terry Brown

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6. **STATE CONTACT** - Stephen Herda
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7. **LEAD AGENCY** - North Dakota Department of Health

8. **SETTING AND OPERATIONS HISTORY**

The Great Plains Synfuels Plant is located approximately 7.5 miles northwest of the city of Beulah, North Dakota. The facility lies within the Knife River drainage basin in the Missouri Plateau section of the Great Plains Region. The facility is constructed on approximately 535 acres of land.

In the 1970's, a consortium of energy companies obtained federally guaranteed loans to finance the construction of the Great Plains Synfuels Plant. Operations began in 1984. The consortium abandon the plant in 1985, and DOE assumed ownership in 1986. In 1988, DOE sold the plant to Dakota Gasification Company, a wholly-owned subsidiary of

Basin Electric Power Cooperative.

The facility is co-located with the Antelope Valley Station, a coal-fired steam electric generating plant also owned and operated by Basin Electric Power Cooperative and the Freedom Mine, operated by Coteau Properties, a subsidiary of North American Coal Corporation.

Operations at the facility produce a synthetic natural gas from lignite coal. The coal gasification process involves the breaking down of the molecular structure of coal to produce carbon monoxide and hydrogen, that are in turn combined to produce methane.

After being crushed to the proper size, which is the first stage of the gasification process, lignite coal is sent to the gasifiers – fourteen 40-foot high cylindrical vessels – where oxygen and steam are introduced, causing a high-temperature combustion/gasification reaction. This reaction produces raw gas containing carbon monoxide, carbon dioxide, hydrogen, sulfur, nitrogen and other substances. The raw gas exiting the gasifiers is split with approximately a of the gas being sent to shift conversion. In the shift conversion unit, the gas is passed through a cobalt-molybdenum catalyst to adjust the hydrogen to carbon monoxide ratio of the re-combined gas to the ratio needed for methanation.

When the raw gas is cooled, a liquid condensate is produced (raw gas liquor) which contains tars, oils, phenols and ammonia. These co-products are removed from the raw gas liquor by various process units (tars and oils – gas liquor separation, phenols – phenosolvan, ammonia – phosam) and are either sold as products or used as fuels in the plant boilers to generate steam. Other co-products, such as naphtha, sulfur, cresylic acid and carbon dioxide, are produced in different areas of the plant. Some of these products are being sold, such as carbon dioxide which is used in Canada for secondary oil recovery in petroleum production.

After the co-products have been removed from the raw gas, the gas is then further purified in the rectisol unit by passing through cold methanol. This process removes sulfur-containing compounds, naphtha, acid gases carbon dioxide and organic impurities.

The final step in the process is methanation, where partially purified raw gas passes over a nickel catalyst, causing the carbon dioxide and carbon monoxide to react with the free hydrogen to form methane. The resulting methane, after leaving the methanation unit, is further cleaned and compressed to be shipped to the purchasers through a gas pipeline.

In 1997, the ammonium sulfate unit came on line. This unit diverts some of the gas stream to produce ammonia which is combined with sulfur scrubbed from the emission control system. Ammonium sulfate is resized from a very fine particulate solid with the consistency of sugar to customer specification. This product is sold under the name DakSul 45, which is derived from the 21% nitrogen and 24% sulfur contained in the fertilizer.

9. **REGULATORY INSTRUMENT (PERMIT/ORDER)**

INSTRUMENT: Hazardous waste storage (containers/containment building) and corrective action permit
ISSUED BY: ND DWM
DATE: Permit renewed July 30, 1996. (New permit pending.)

10. **REGULATED UNITS**

There are 2 RCRA-regulated hazardous waste management units on-site. These are the Container Storage Area and Bulk Storage Facility. The Container Storage Area is a building utilized for storing containerized solid or liquid hazardous wastes. The Bulk Storage Facility is a containment building utilized to store non-liquid solid and hazardous wastes.

11. **WASTE GENERATION/TREATMENT/DISPOSAL PRACTICES**

Wastes generated during facility operation include: lab solvent wastes (D001), heavy metal wastes (D009), acetone/toluene/acetonitrile (D001), mineral spirits (D001), spent caustic/acid (D003), waste 1,1,1-trichloroethane (D), spent shift catalyst (D), waste lab chemicals (various D and U listings) and process clean outs (Bevill exempt wastes).

DGC operates a special waste landfill for the coal ash and other process wastes generated during the coal conversion process. Much of the non-hazardous waste generated on site is subsequently disposed in the special waste landfill, including Bevill exempt wastes. Bevill exempt wastes are certain high volume, low toxicity wastes produced by industry. DGC produces two Bevill exempt wastes, one non-wastewater and one wastewater. The non-wastewaters include the coal gasification ash, boiler cleanout and other process unit clean outs. The wastewater stream includes wastewaters discharged and managed by the oily water sewer system.

12. **RCRA COMPLIANCE STATUS**

No compliance issues at this time

13. **POTENTIAL FOR RELEASES**

The RFA, dated February 1992, identified twenty-two (22) SWMUs (including both RCRA-regulated HWMUs), and five (5) AOCs. In 1995 an additional AOC was identified; Rectisol (Area 1400).

14. **CORRECTIVE ACTION STATUS AND STABILIZATION ACTIVITIES**

A. Stabilization measures needed? Yes
B. Stabilization measures implemented? Yes

In August 1994, the Fire Training Area (SWMU #13) was surveyed. In September 1994, 750 cubic yards of contaminated soils/scoria were removed and landfarmed in the permitted special waste landfill.

In July 1995, the Oily Water Sewer (SWMU #6) was surveyed using a robotically operated video camera. Based upon the results of the video data, approximately 1000 feet of corroded piping was replaced during the summer of 1996.

In September 1997, DGC installed two recovery wells located in the tank farm (Area 1810/1820) and Rectisol (Area 1400). These recovery wells capture contaminated ground water and direct it to the oily water process sewer which is connected to the oily water treatment system.

In October 1997, the area surrounding the Ash Water Sumps (SWWMU #17) was covered with concrete. This allowed for collection of ash water from disposal vehicles to be captured rather than allowed to infiltrate to ground water.

C. Have all necessary stabilization measures been completed (for all areas/units)? Yes
D. Current human exposures under control? Yes
E. Current ground water releases under control? Yes
F. RFI imposed for all areas/units? Yes - for those needing investigation
G. RFI workplan approved? Yes
H. RFI final report approved? Yes
I. CMS Workplan approved? No (Submitted 2/28/00, comments pending)
J. CMS final report approved? No
K. Was a human health risk assessment done (or is it being done)? Yes
L. Was an ecological risk assessment done (or is it being done)? Yes
M. Final Remedy selected? No
N. Describe final remedy selected: N/A
O. Has a TI waiver been requested? No
P. CMI initiated? No
Q. CMI completed? No
R. Other relevant corrective action status information: None

15. COMMUNITY INVOLVEMENT

Public hearings were held during the permit public comment periods.

16. MAJOR UP-COMING ACTIVITIES

None.

17. PROBLEMS/ISSUES

None.